

EXHIBIT 2

(Filed Under Seal)



Cast for Audio

Initial UX spec 6.5.2014



Agenda

- Introduction
- Casting and discoverability
- Device states and transitions
- Device UI integration
- Multi-Zone Groups
- Updates

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Introduction



Cast for Audio

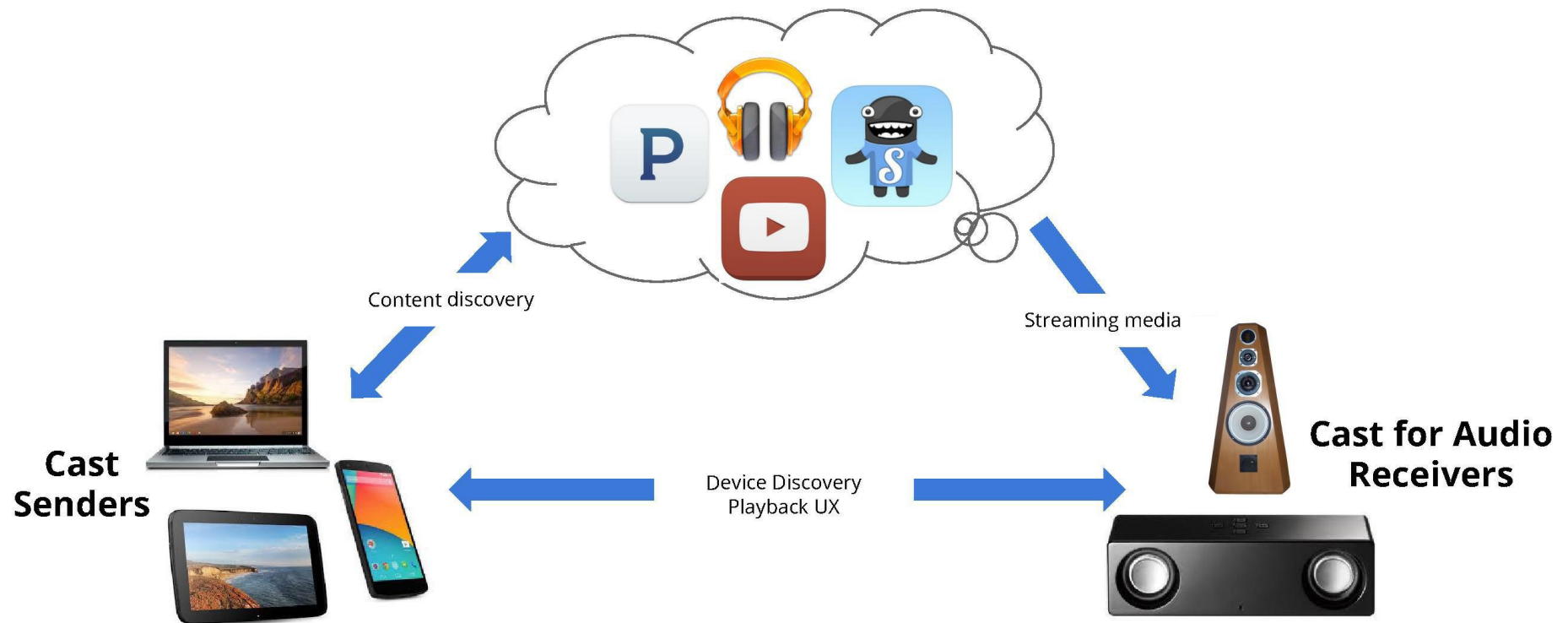
Integrate the Google Cast technology into 3rd party audio devices supporting audio key use cases and UX



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Google Cast for Audio - Main concepts



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Relevant device types

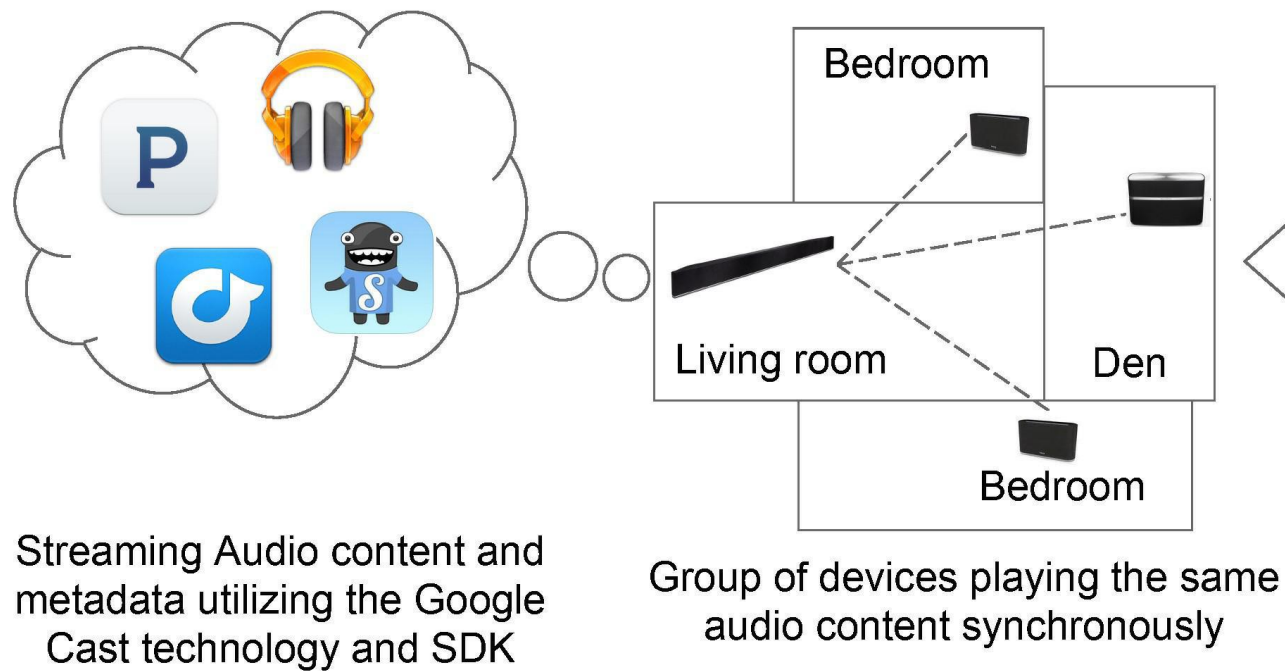
- Wireless speaker systems (main focus)
 - Zone speakers
 - Bedside speakers
 - Portable zone speakers
 - Mini/Micro bookshelf speakers
- Soundbars and Soundbase
- AV receivers
- Multi-Channel Home theatre systems

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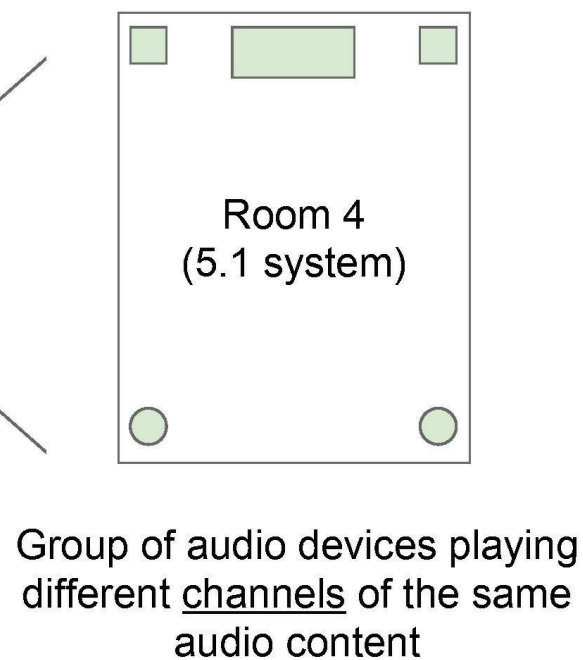


Definitions

Multi-Zone Groups



Multi-Channel Groups



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C4A Program overview

- Uses Google Cast SDK
- Enables existing Google Cast content support for C4A devices
- Streaming only Audio & metadata (No Video/Graphics)
- Setup through Google Cast app and OEM's setup flow
- Cast SW Includes Cast Multi-Zone feature
- Plays on top of OEM's Multi-Channel mechanisms

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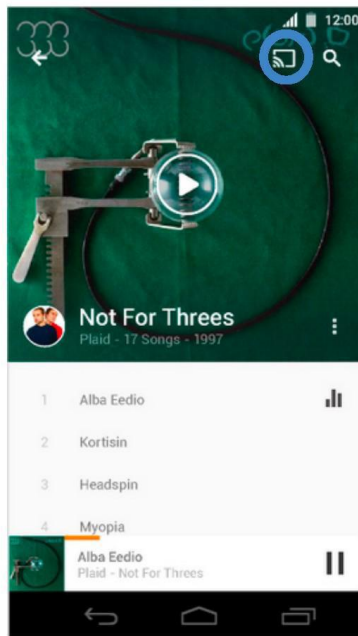


Casting & Discoverability

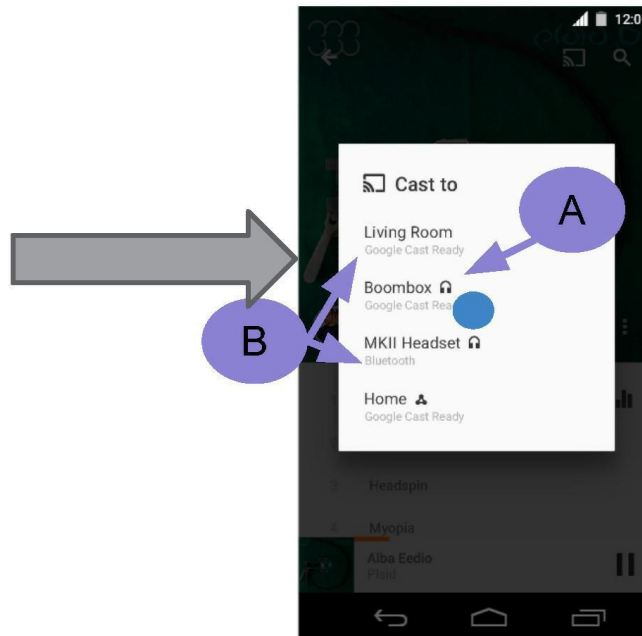


Start casting to a C4A device

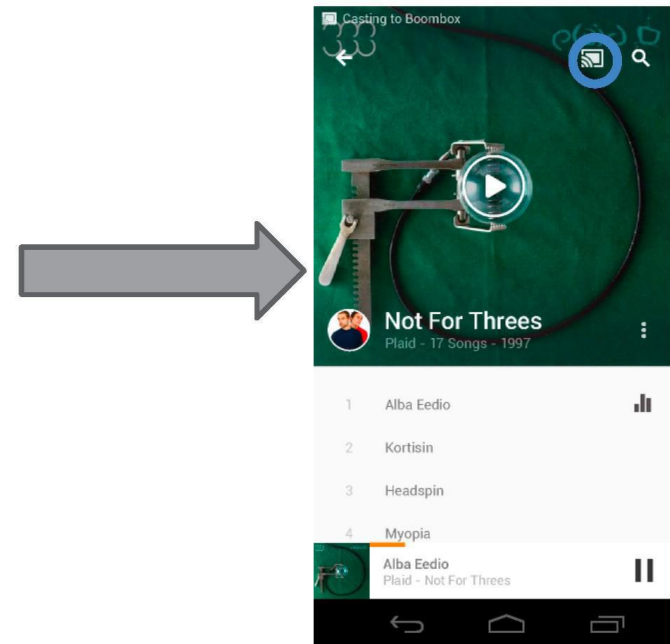
C4A devices shall use a special icon differentiating them from non-audio devices (A)
On the Cast list, devices will show the Media Route identifier while Idle (B)



User press the Cast button a



User sees the C4A devices with and selects it

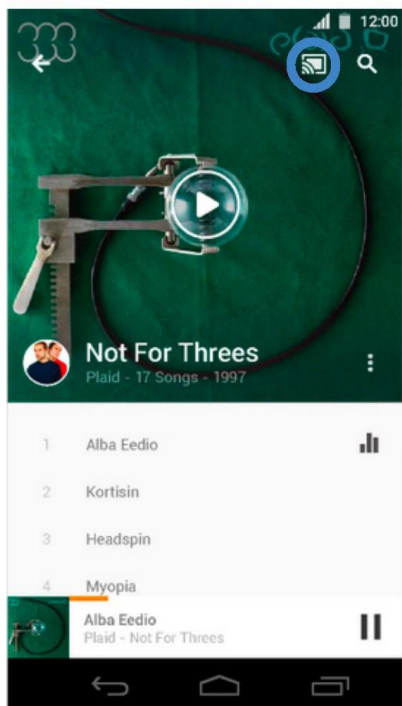


Cast button indicates connection

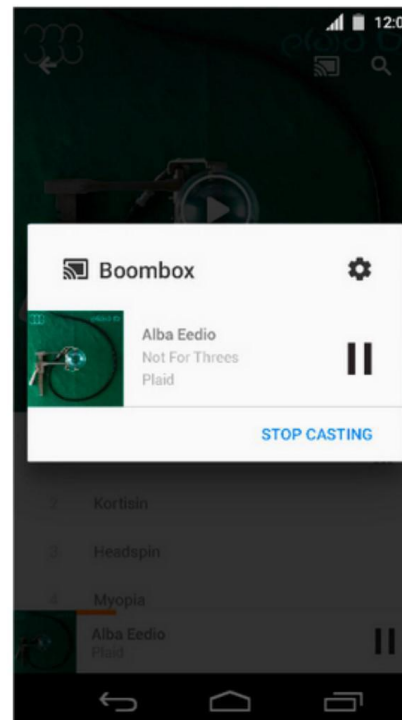
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C4A Cast control through the Cast menu



User press the Cast button while casting

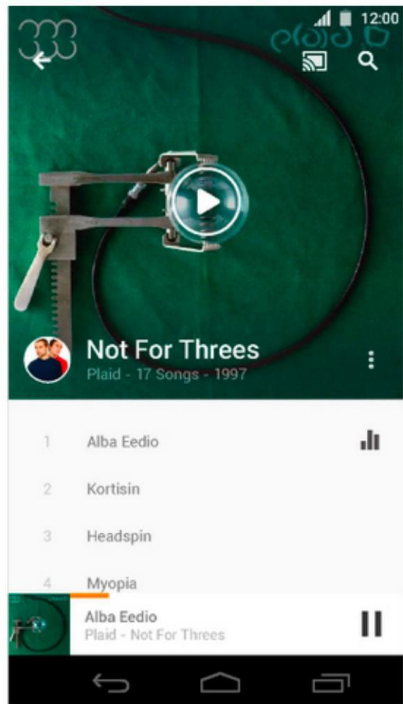


User sees the Cast control menu

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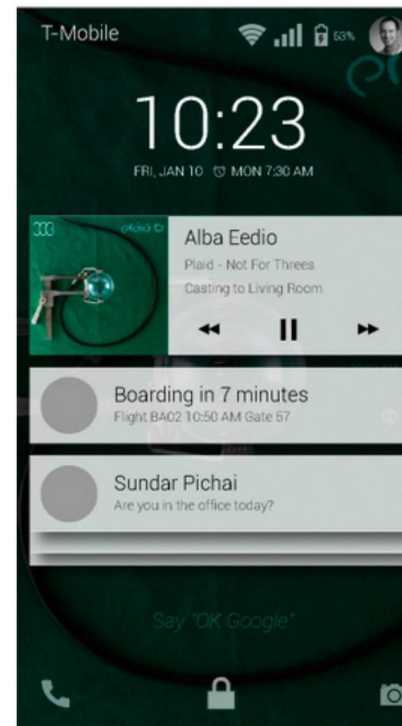


C4A Cast control through the lock screen



User is casting Play Music

Android Screen lock



User control casting through the lock screen

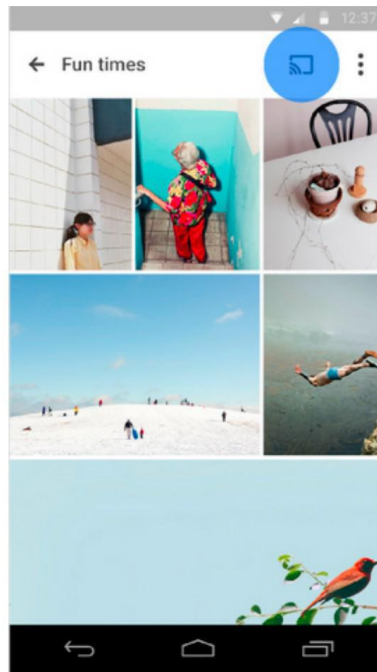
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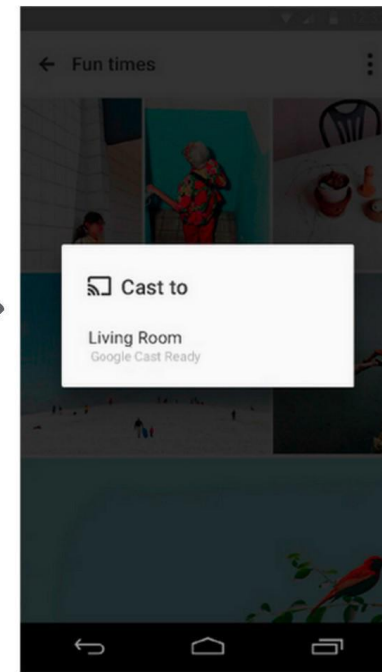
C4A Discoverability - non-supported content apps

Apps shall use the dev-console to signal they support C4A devices and groups , else C4A devices will filtered in cast menu

Content Provider didn't
enable support for Audio
only devices and groups



User press the Cast
button



User doesn't see the
C4A devices

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Device states and transitions



Device states UX goals

- While connected to network
 - Cast is always available for casting and management
 - Regardless of device power states
 - Regardless of current input source/playback status
- Soft AP functionality is always available for casting
- Support for portable/battery devices - detailed OEM discussion

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C4A device states and expected behaviour

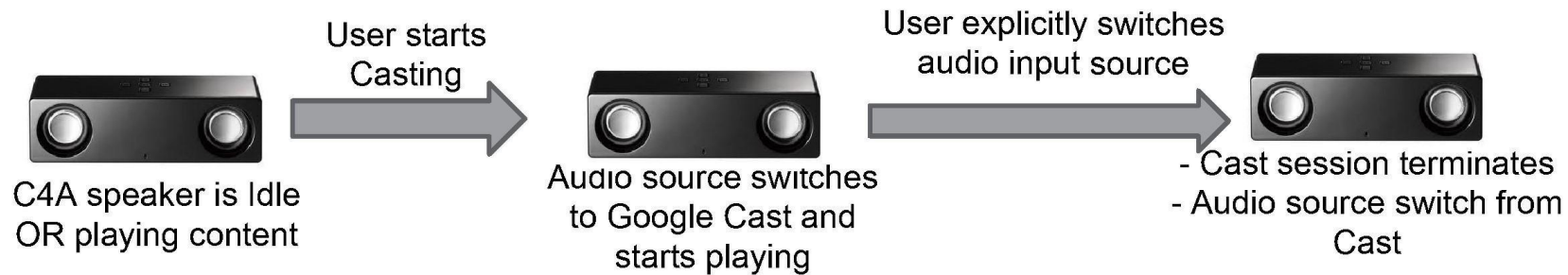
C4A device states	General description	Connected to network	Discoverable for Casting	Discoverable for configuration	Soft AP
Off	Device is off, no Cast functionality	No	No	No	No
Not setup	- Cast setup hasn't been completed - Awaiting user setup	If Ethernet/Wifi has been connected	No	Yes	Yes
Setup & connected to network	- Cast setup completed - Device is connected to the network - Ready to Cast	Yes	Yes	Yes	Yes
Setup & Disconnected from network	- Cast setup completed - Device is disconnected to the network - Awaiting network configuration	No	No	Yes	Yes

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Audio input source changes

When Casting starts, C4A device shall switch to Cast audio input source regardless of previous playback or power state



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Device UI integration



Display and UI integration UX goals

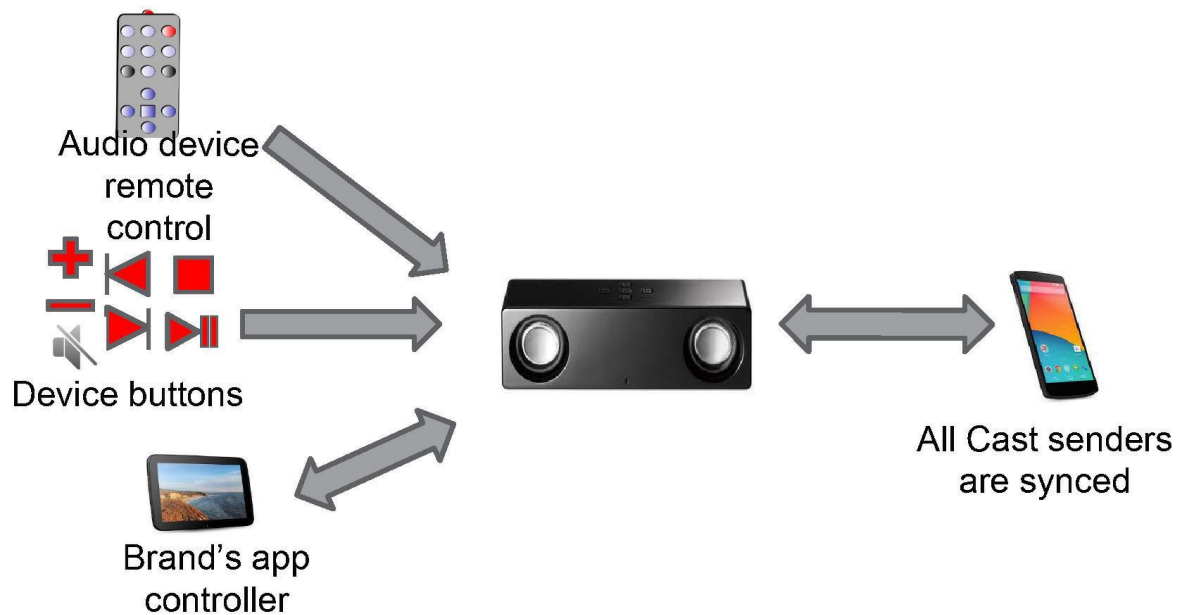
- Playback & volume controls will be synced among device controllers and sender apps
- Device UI indicates device and Cast status & metadata
- Cast Volume control shall affect the system outputs volume
- Volume levels reflected Cast:
 - Focused on user friendly levels
 - Clip very high volumes (i.e. AVRs)

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Playback/Volume control sync with device controllers

- If C4A devices support playback/volume control buttons, they will be synced with the sender app
- Cast SW is responsible for syncing controls in cast sessions



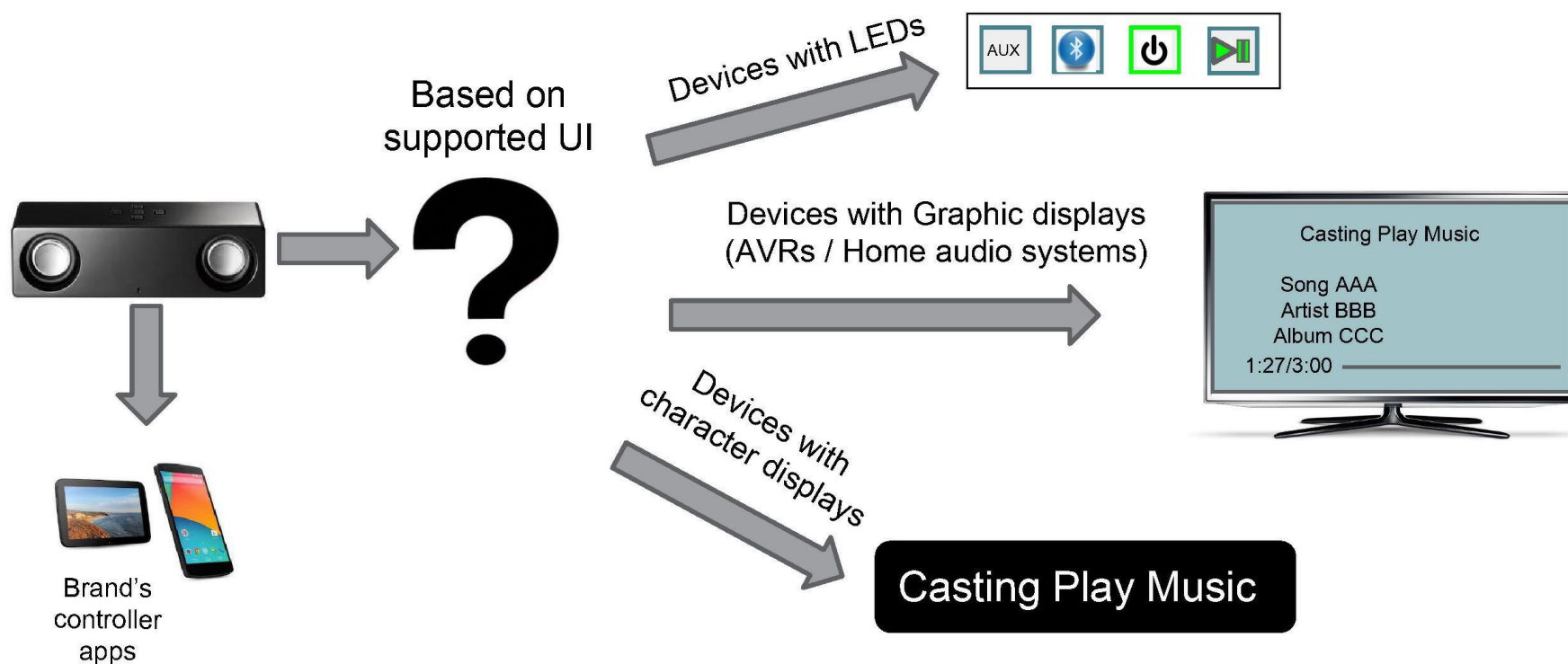
Key	Action
Stop	- Terminate active casting sessions
Play/Pause	- Play/Pause playback
Next/Previous	- Move to Next/Previous track on playlists and relevant content
Volume Up/Down	- Changes the device master volume - While Muted, volume up unmutes
Mute	- Mute volume

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Brand's UI requirements and metadata usage

C4A devices shall provide the user status and metadata, through the supported UIs and apps



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Available Status & metadata

General status:

- Needs setup - Yes/No
- Connected to network - Yes/No
- Cast receivers & groups configurations
- Update in progress
- Error states
- Volume status: Mute/volume
- Connected/non-connected to a content app
 - When Connected - app name

During Playback (optional)

- Player state: Idle, Playing, paused, buffering
- Stream type - Live, buffered
- Current time in track (including live casting)
- Duration of the track
- Title
- Artist
- Album Name
- AlbumArtist

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Cast states

Use Case	UI Requirements
Update is taking place	Relevant UIs should indicate update is taking place
Errors	Relevant UIs should indicate error status, and for user to try again
Connected to a Cast app	Relevant UI should indicate that Cast is “Connected to [AppID]”
Actively casting	Relevant UI should indicate that Playback is in progress and that device is “Casting [AppID]”

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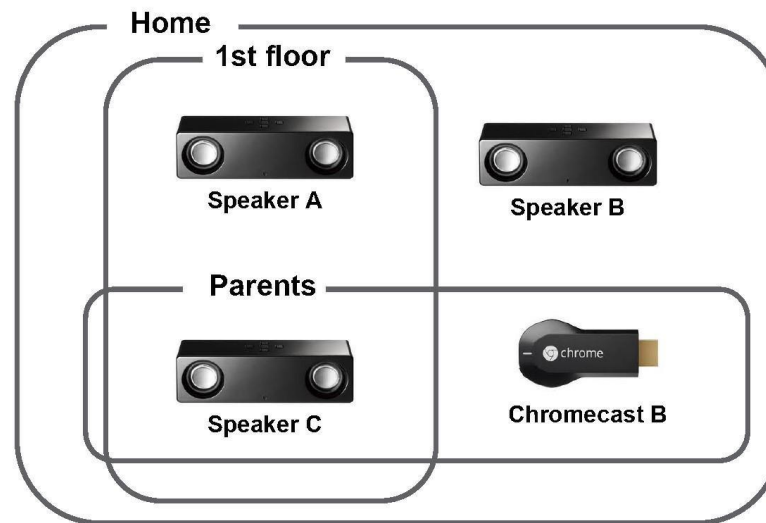


Multi-Zone Groups



Multi Zone Groups - C4A Device<->Group relationship

- Each C4A device can be a member of several groups
- Chromecasts shall be supported as group members
- Up to ~10 devices speakers in a single group

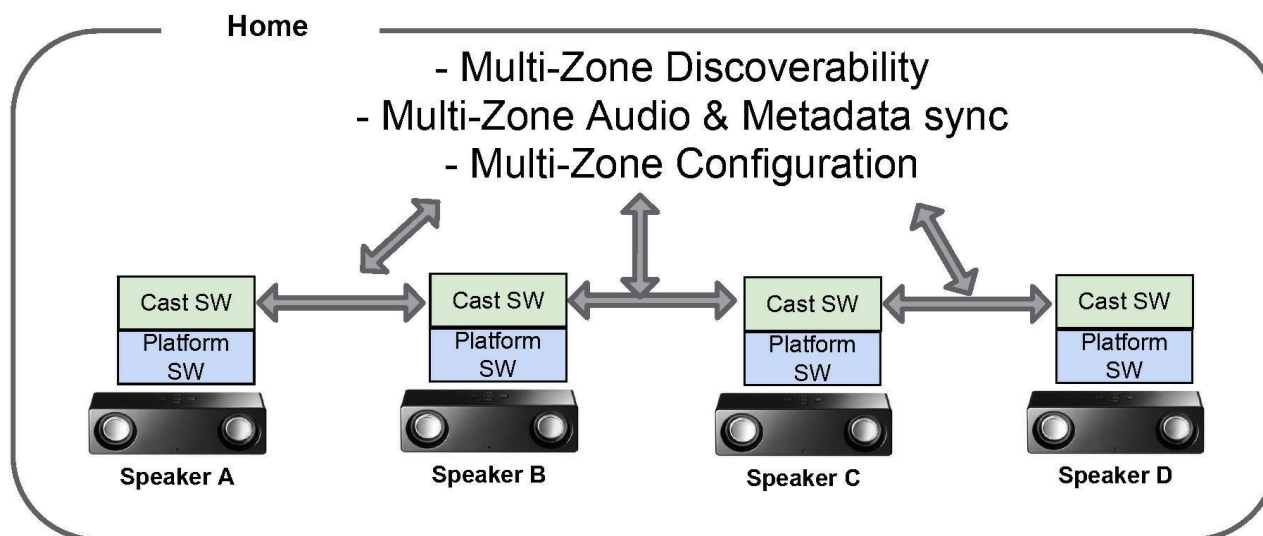


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Multi Zone Groups - Cast SW partition

- Cast SW & SDK shall be responsible for the Cast Multi-Zone mechanism
- Brand's apps shall be provided with an SDK to support Group configuration

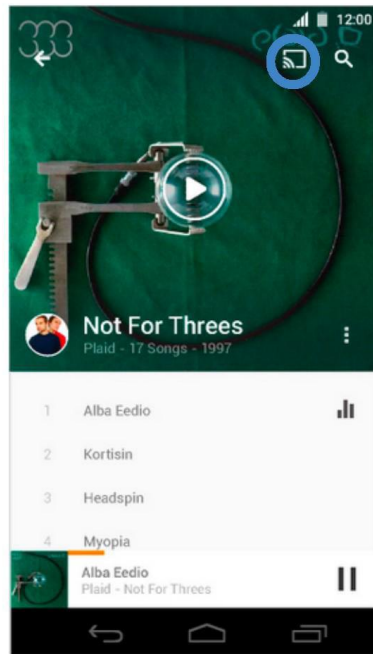


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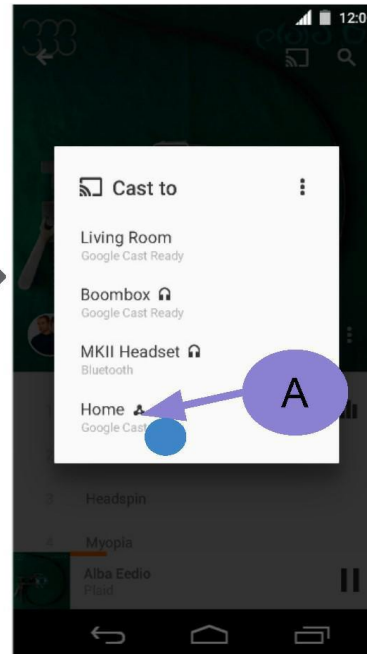


Start casting to a Multi-Zone group

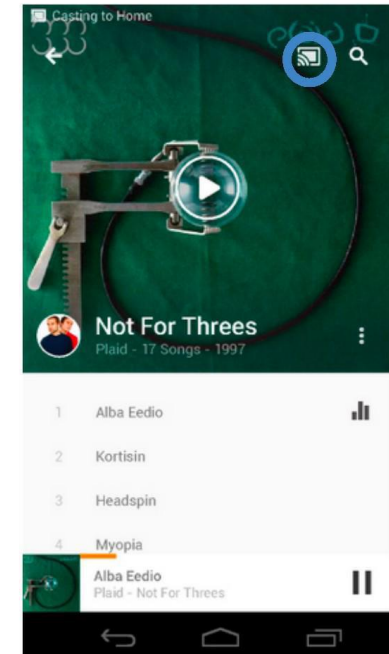
Multi-Zone groups shall use a special icon differentiating them from other devices (A)



User press the Cast button



User sees the C4A devices with and selects it



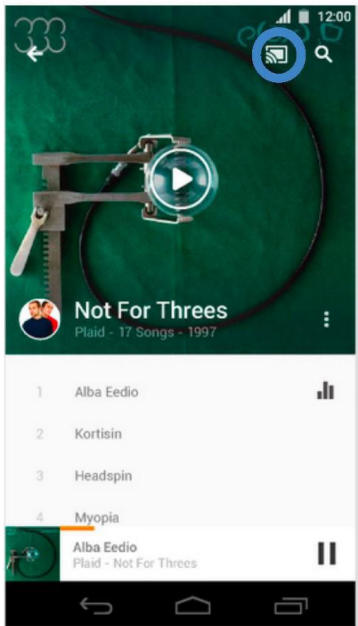
Cast button indicates connection

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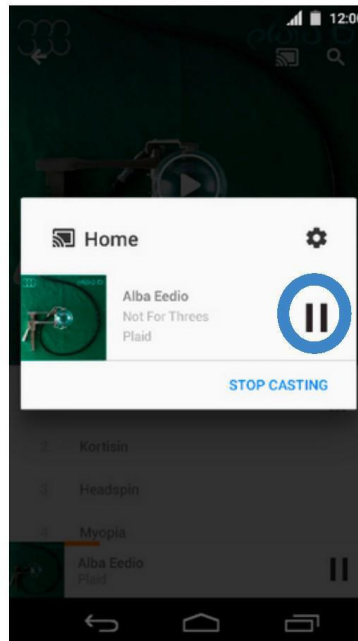


Group playback control through the app Cast menu

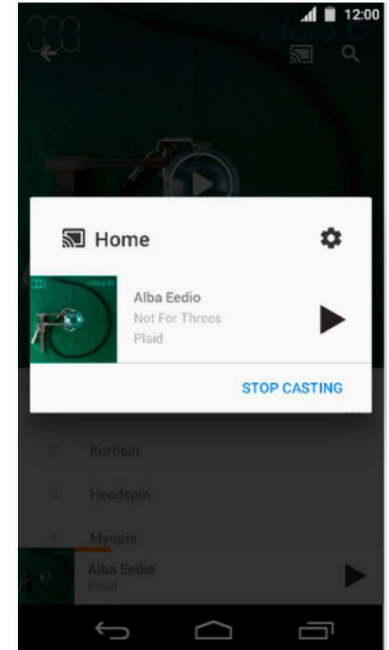
When Casting to a group, playback through the content app is similar to regular C4A casting



User press the Cast button while casting to a Group



User press pause in the Cast control menu



Content is paused

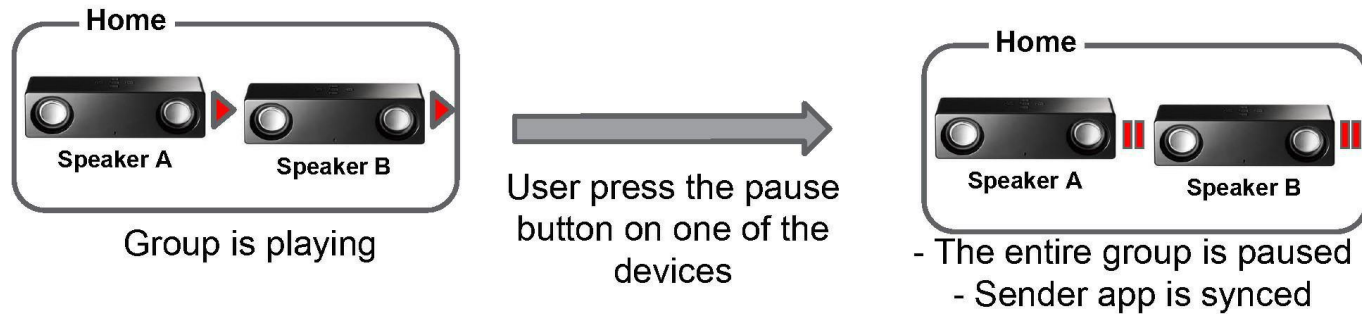
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Group playback control through device controllers

Playback control through specific device controllers - shall affect all the group

Relevant for: **Pause/Play, Next/Previous and Stop**

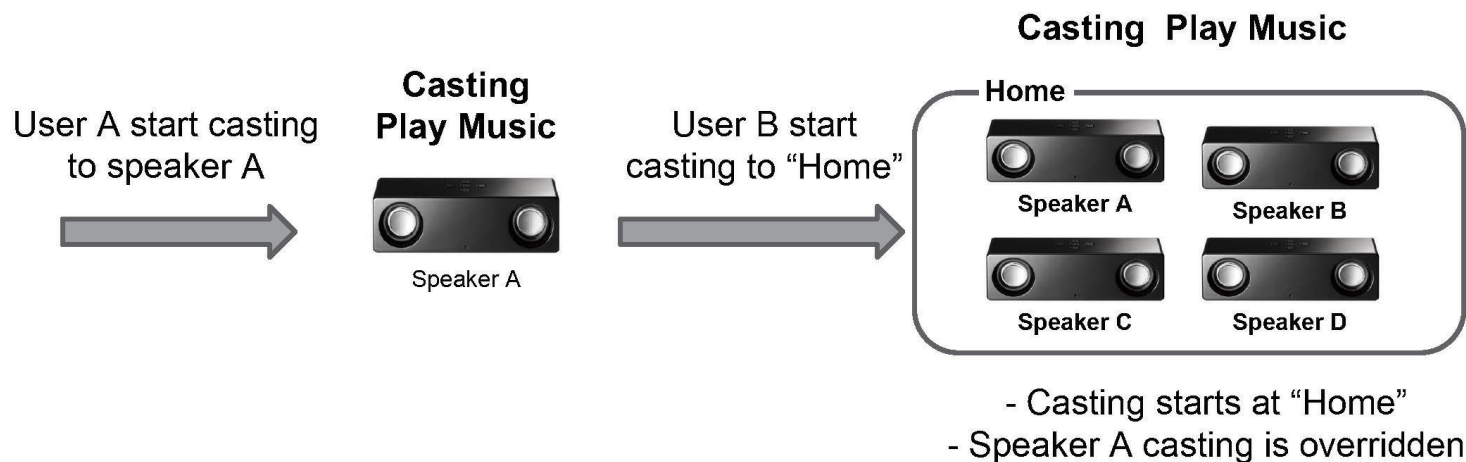


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Multi Zone Groups - Overriding previous cast

- For every speaker the last request overrides previous casting

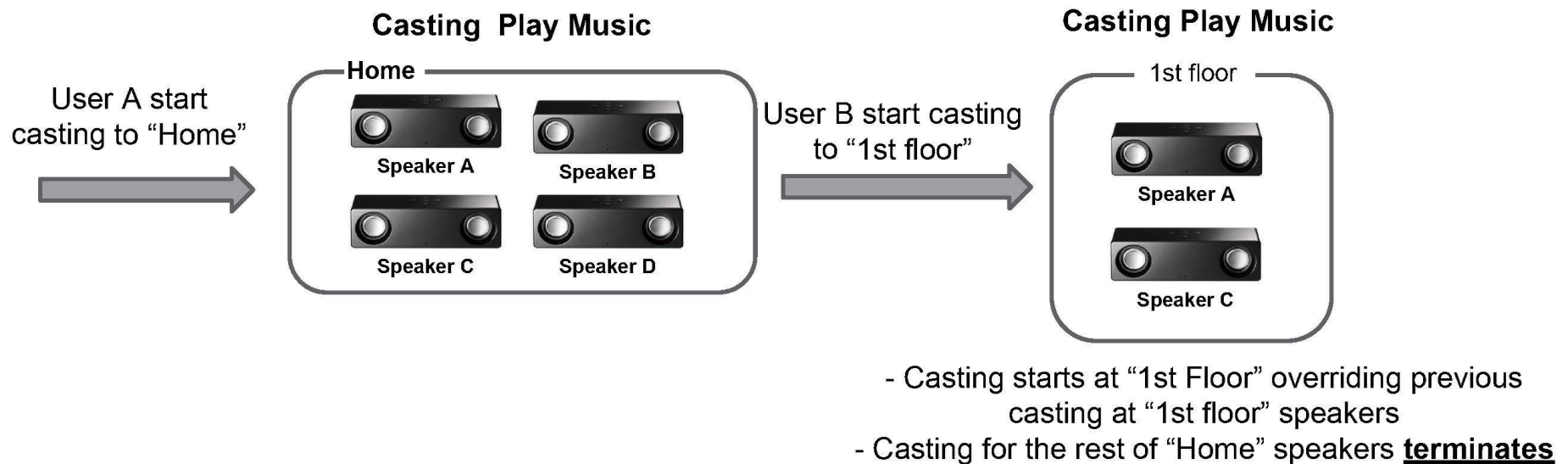


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Multi Zone Groups - Overriding previous cast (2)

- Playback **terminates** on speakers which are not overridden



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Group volume and mute controls UX goals

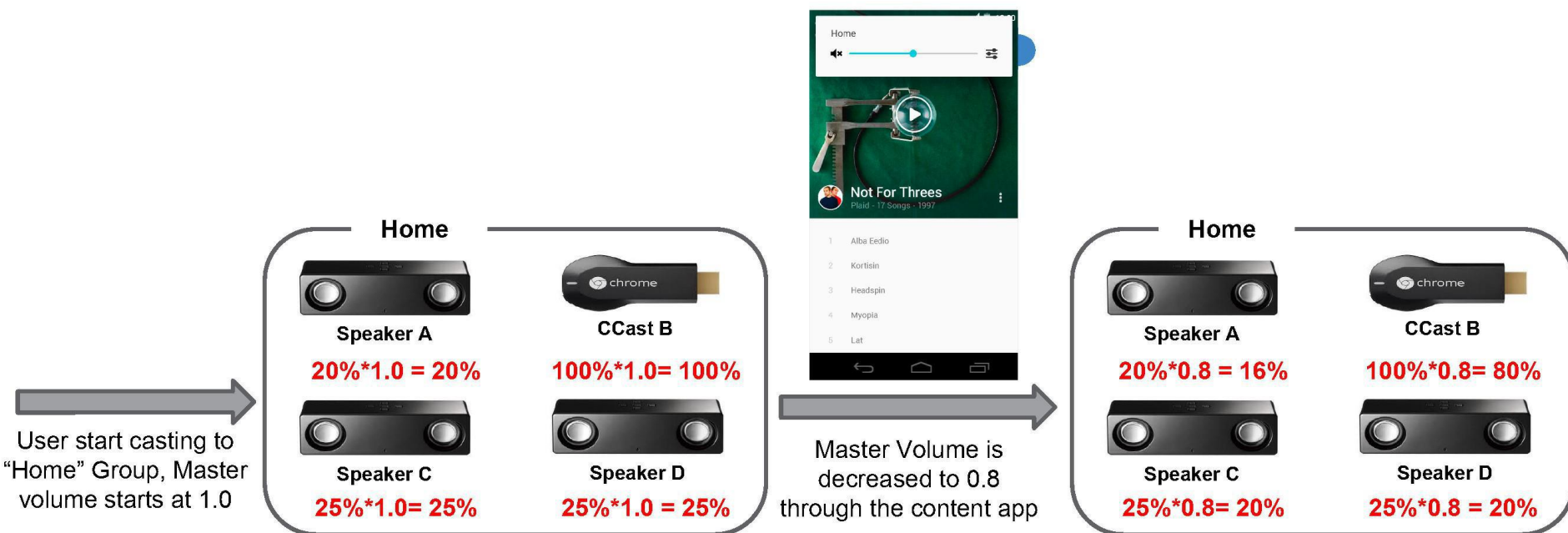
- Content app is controlling the Group Master volume and mute status
- Define the Master volume behaviour:
 - Allow user to decrease volume to 0% across all devices
 - Allow user to jointly increase volume for all the group's devices
 - Address the uniqueness of every device volume behaviour
 - Chromecast - digital attenuation
 - Speakers - variety of volume curves
 - AVR - extremely high volume level support
- Easy & accessible way for the user to individually control volume & mute for each speaker in the group

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Multi Zone Groups - Master volume

- Group's Master Volume shall be a multiplier ranging 0-2 that will multiply the existing system volume of all the group's devices, to create the real volume level to be used at output.
- Upon starting the session Master volume will always default to 1.0 (middle of the volume slider)

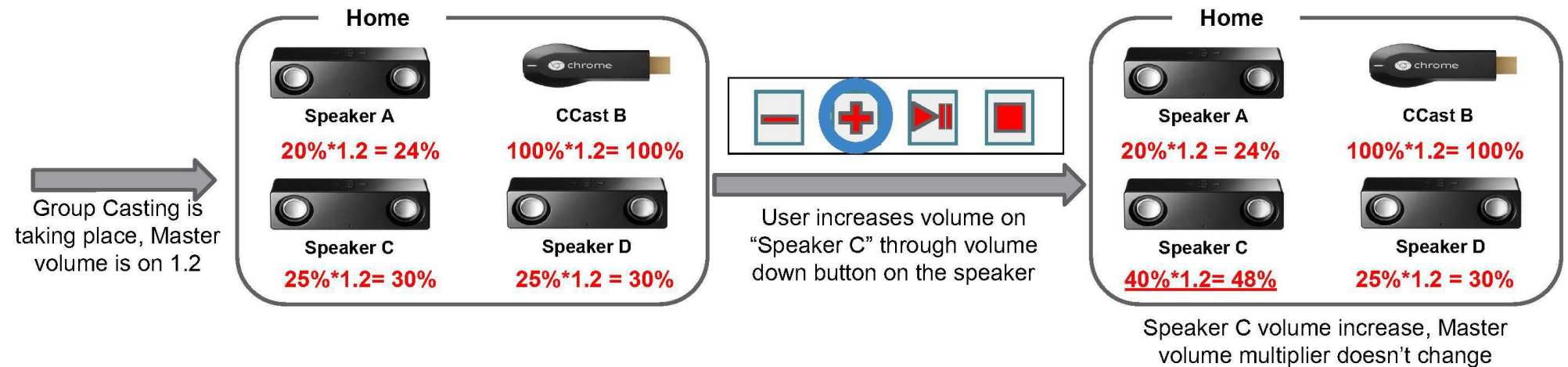


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Multi Zone Groups - Master volume (2)

- Changing the individual volumes shall not affect the Master Volume multiplier



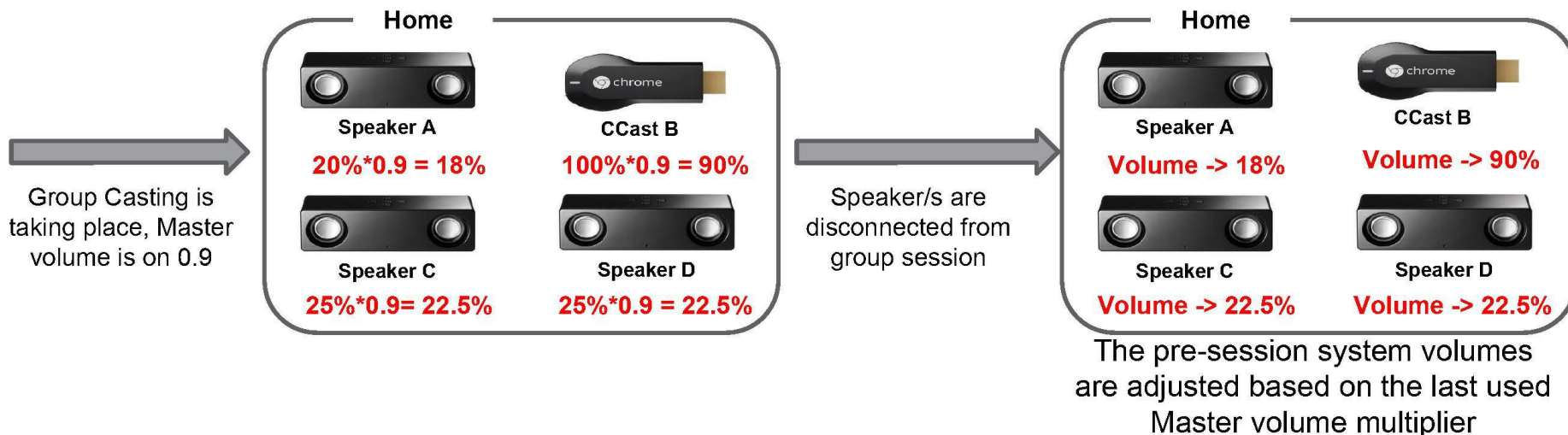
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Multi Zone Groups - Master volume (3)

As soon as a device ends the Group session, It will apply the final result of :

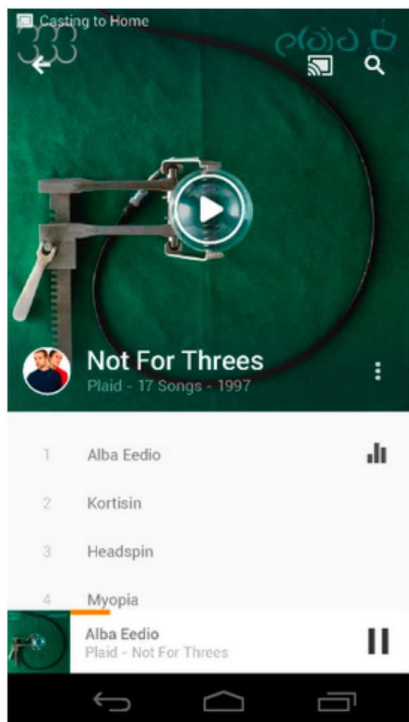
Final system volume= Starting System Volume * Final Master volume Multiplier



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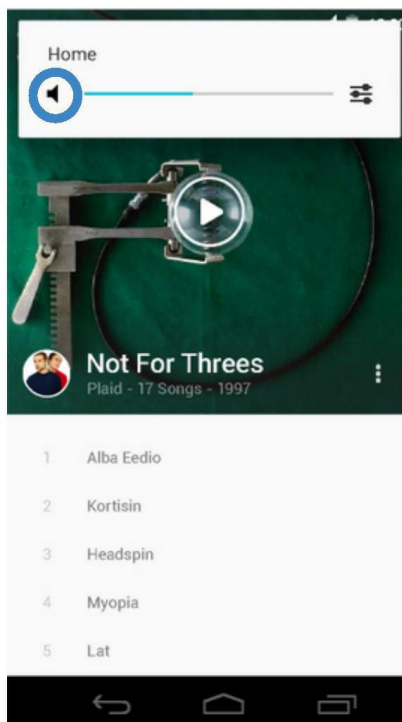


Mute group through content app



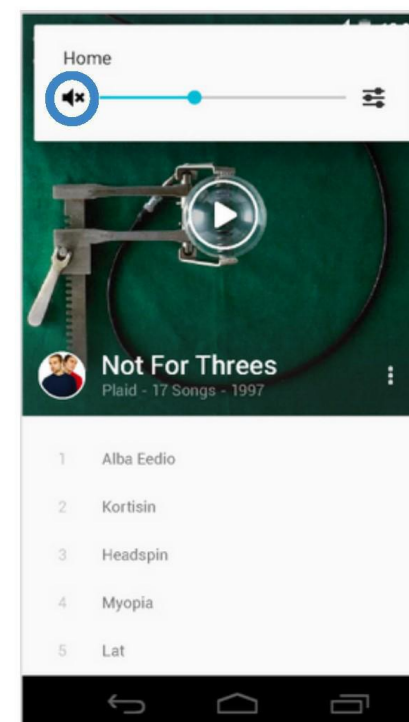
Casting Play Music

Mute through
the content app



Entire group is muted

unmute through
the content app



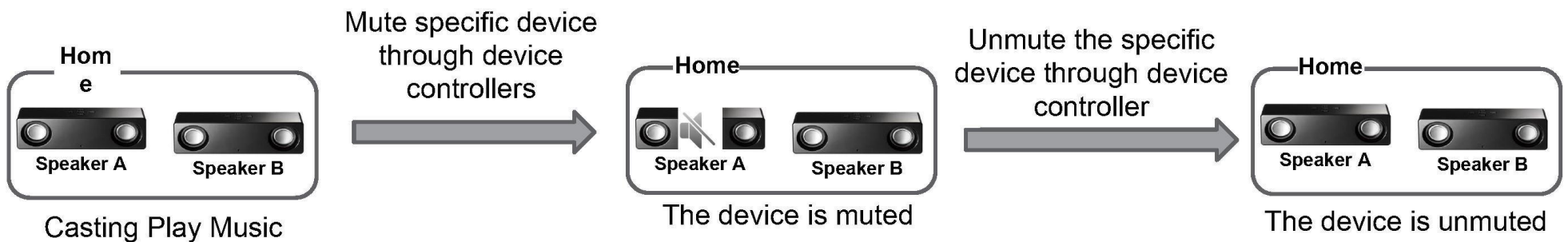
Entire group is unmuted

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Mute Group through device controller

- Muting/unmuting through device controller will only affect that device
- Unmuting in the content app **shall not** unmute manually muted devices

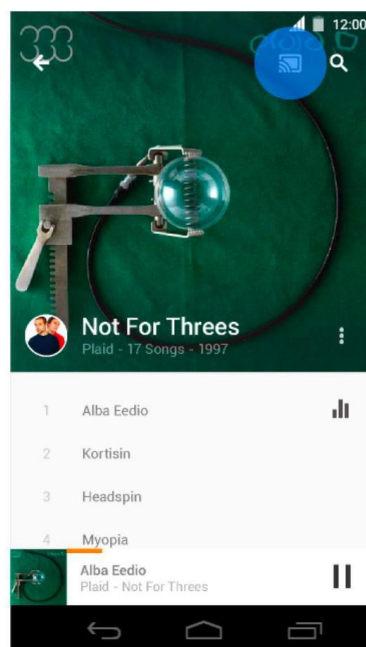


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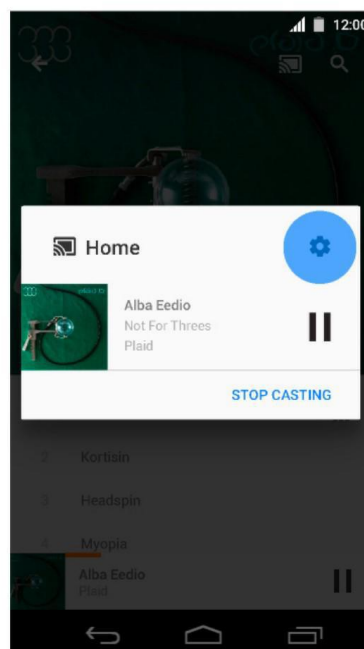


Quick Access to group configuration

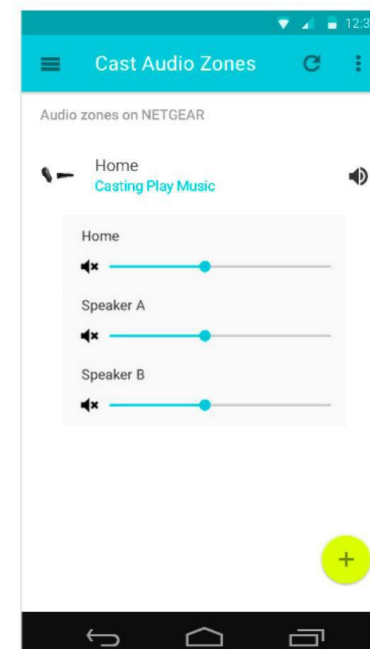
- While Group Casting, the cast button will provide a UI to launch the Cast app group configuration
- Group configuration will allow easy access to volume & mute control



User press the Cast button while casting



User press the settings quick access button



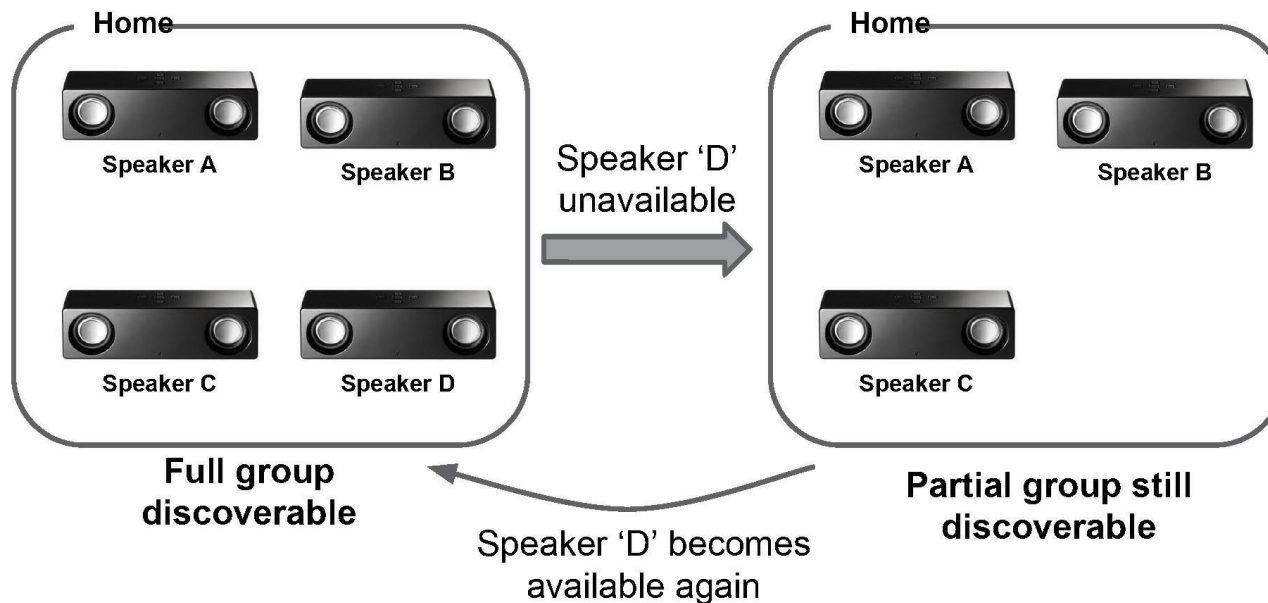
User gets to the group configuration screen

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Groups discoverability - device unavailable

When a device in a group becomes unavailable (disconnected, etc), the rest of the group shall still be discoverable

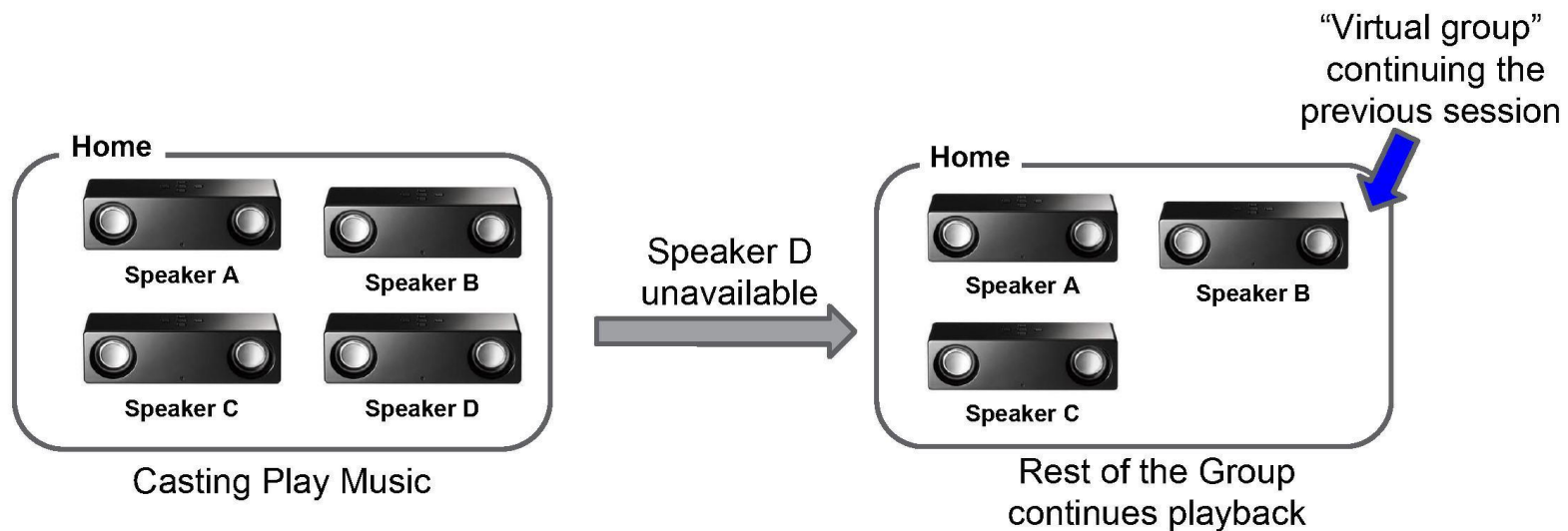


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Groups Casting - device unavailable

When a device in a group becomes unavailable (unreachable for X seconds etc.), the rest of the group continues casting



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Updates



C4A Update UX goals

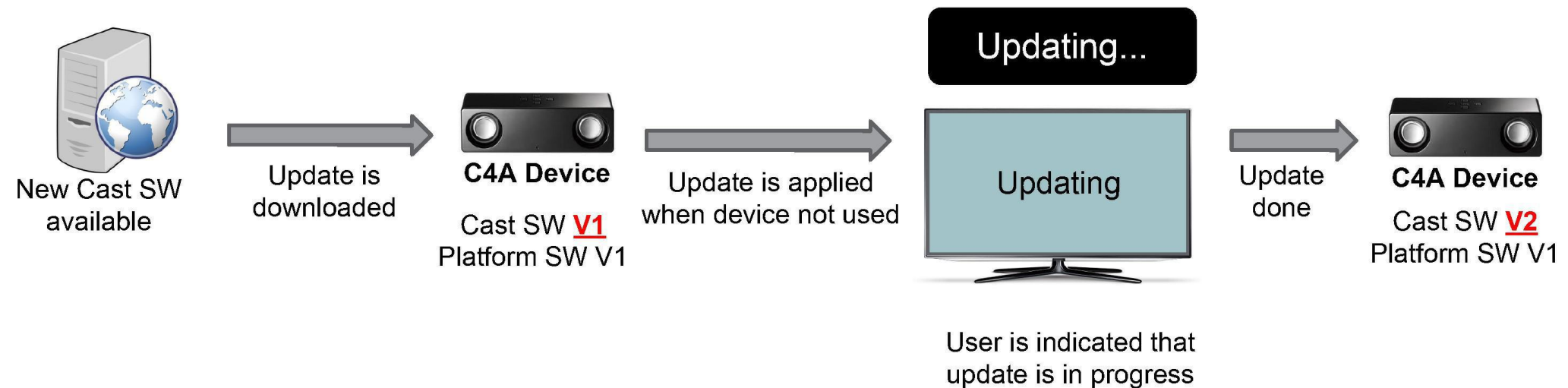
- Pushing Cast & Platform SW updates in a “user friendly” way:
 - Without interfering the user
 - No user intervention
- Support upgrading ‘Legacy’ platform to C4A devices
- Adjust update flows for “no-display” devices:
 - Indicate updates to the users through supported UIs
 - Integrate zero-day update into setup flow

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Google Cast SW updates

Cast SW update shall be applied at a user friendly times, based on Google Cast heuristics



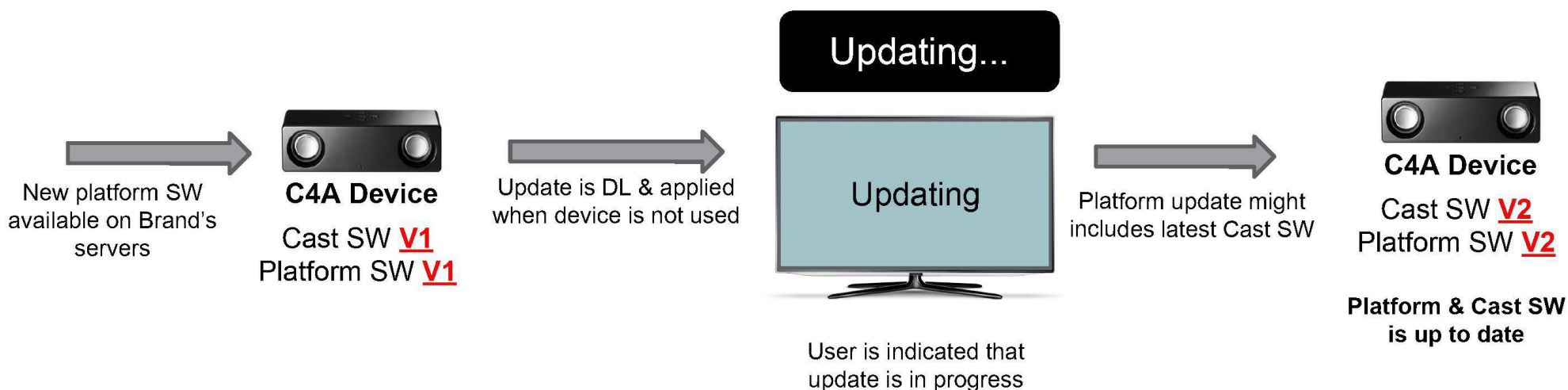
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Platform SW updates

Updates shall be applied when device is not used:

- No active playback & timeout since last activity & “Late night” local time
- During “late night” local time
- Upon Cast SW request (Mandatory updates)



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Updating “legacy” device to Cast enabled device

- Brand will be able to upgrade his legacy devices for C4A functionality
- Upon Update, user will be required to go through mandatory setup steps before Cast becomes functional

“Legacy” device which
can support C4A



C4A Device

Cast SW - Provision
Platform SW V0

Full platform
update, including
Google Cast SW

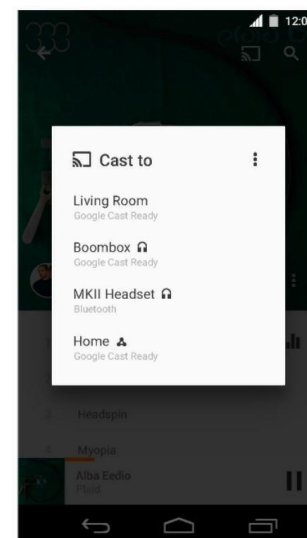
SW is updated
to support Cast



C4A Device

Cast SW V1
Platform SW V1

User goes through
mandatory setup steps
in brands/cast app



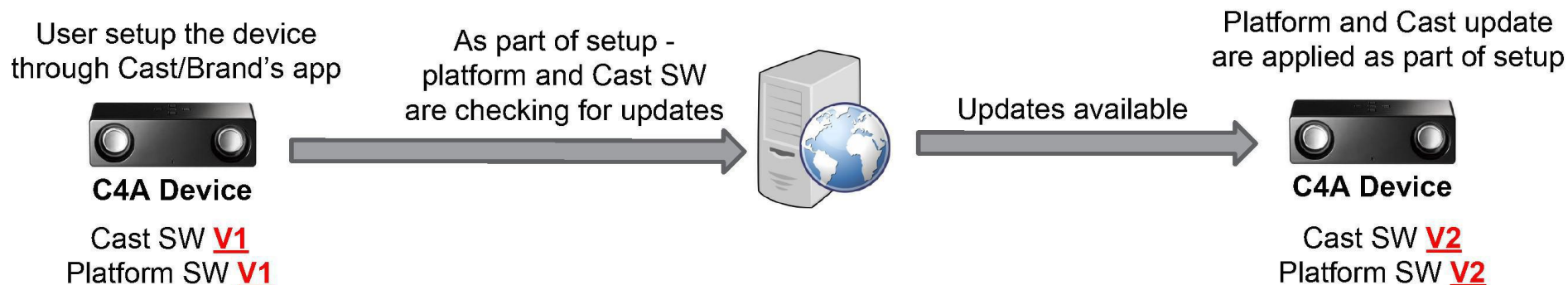
C4A functionality becomes
active for the user

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Updates - C4A Zero-Day OTA

- Zero-day OTA shall be part of the setup process and will include both platform and Cast SW updates
- Zero-day OTA shall be supported through both Brand and Cast app setup



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